



# MACROECONOMIC INDICATORS OF FOREIGN EXCHANGE RESERVES IN INDIA

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## ABSTRACT

Foreign exchange reserves received considerable attention among the developing economies with the opening up of these economies after 1991 new economic reforms. The importance of managing the foreign exchange reserves gathered momentum over the years due to increase in capital inflows in the form of investments, expanding trade activities and external commercial borrowings (ECBs). According to International Monetary Fund (Balance of Payments Manual, and Guidelines on Foreign Exchange Reserve Management, 2001), which defines reserves as “external assets that are readily available to and controlled by monetary authorities for direct financing of external payments imbalances, for indirectly regulating the magnitudes of such imbalances through intervention in exchange markets to affect the currency exchange rate, and/or for other purposes” (Bhakri and Verma, 2020). Foreign exchange reserves (FER) are also maintained in order to meet uncertainties in a country. It is regulated and managed by the various countries' central banks. The current paper has focused on the trends in various macroeconomic indicators of foreign exchange reserves in India. The paper has emphasized on the analysis of four policy periods namely, Liberalization, Globalization, World Recovery and Global financial crises and their impact on foreign exchange reserves. It will be using semi log growth equation model with dummy variables to find out the growth rates in various macroeconomic indicators for different policy periods (Bhakri and Verma, 2020). The ten variables namely, total exports, oil import, food import, other import, total imports, inflow of foreign direct investment, external commercial borrowings, total external debt, short term foreign external debt (as a % of total debt) and debt repayments, are being considered for the analysis.

**KEYWORDS:** Foreign Exchange Reserves (FER), External Commercial Borrowings (ECBs), Liberalization, Globalization, World Recovery, Foreign Direct Investment (FDI), Oil Import, Food Import, Other Import.

## 1. INTRODUCTION:

Foreign exchange reserves received considerable attention among the developing economies with the opening up of these economies after 1991 new economic reforms. Over the years it has been observed that rapid increase in globalization and acceleration of capital flows lead to integration of capital markets domestically and globally as well (Bhakri and Verma, 2020). Though this has opened various opportunities for emerging market economies (EMEs), at the same time have posed various challenges to such economies. The policy makers faced several issues and dilemmas relating to foreign exchange reserves management during late 80s' due to debt crises in the developing world.

The importance of managing the foreign exchange reserves gathered momentum over the years due to increase in capital inflows in the form of investments, expanding trade activities and external commercial borrowings (ECBs). According to International Monetary Fund (Balance of Payments Manual, and Guidelines on Foreign Exchange Reserve Management, 2001), which defines reserves as “external assets that are readily available to and controlled by monetary authorities for direct financing of external payments imbalances, for indirectly regulating the magnitudes of such imbalances through intervention in exchange markets to affect the currency exchange rate, and/or for other purposes” (Bhakri and Verma, 2020). Foreign exchange reserves (FER) are also maintained in order to meet uncertainties in a country. Reserves are maintained in the currencies mostly in dollars, euro, British pound sterling and Japanese yen as well.

Foreign exchange reserves are divided into the theory of reserves, and the management of reserves (Bhakri and Verma, 2020). The theory of reserves explains institutional and legal aspects for holding reserves, whereas definitional and objectives and appropriate level of foreign exchange reserves are explained under management of reserves. Theory of reserves encompasses the basis for holding foreign exchange reserves.

Portfolio management of foreign reserves focusses on the deployment of foreign reserve assets, liquidity, safety and major objectives of reserve management. The reserve assets include gold bullion, unallocated gold accounts reserves with IMF, special drawing rights and other deposits, debt securities, loans, financial derivatives etc. There is no equivalent entry for reserve assets in the liabilities column of the international investment position. If there is any kind of liability of monetary authority of a country, it is reflected in the other investments.

In India, the Reserve Bank of India Act 1934, where RBI act as the custodian of foreign exchange reserves and managing reserves with the defined objectives. The term ‘reserves’ include both reserves held in the form of gold assets, the banking department and foreign securities maintained by the issue department (Bhakri and Verma, 2020).

Reserve determination are purely trade based models which covers the opportu-

nity cost and foreign exchange market according to traditional approaches of reserve determination. Before 1991, balance of payments crises, traditional approach is being used to maintain the adequate level of foreign exchange reserves which is also known as the import cover, defined in terms of number of months of imports equivalent to reserves. During the post reform period, there has been paradigm shift in the approach of maintaining the reserves and emphasis was laid on short term debt discharging and medium term debt servicing.

The features like free capital mobility, risk return trade off and complications due to intermediate exchange rate system are considered under the contemporary reserve demand models. Earlier studies on optimum reserves mainly identify three primary motives for accumulating reserves, namely, transaction motive, precautionary motive and speculative motive (Reddy, 2002). While transaction motive applies to reserve demand by the commercial banks, precautionary motive dominates the central bank reserve accumulation behaviour. Besides keeping reserves for meeting the balance of payments deficits, countries also keep certain amount of reserves for meeting unforeseen contingencies (Bhakri and Verma, 2020).

In the post reform periods the management of reserves has been evaluated with the help of cost and benefit analysis (CBA). The opportunity cost of maintaining high level of foreign reserves comes on cost side and maintaining sufficient level of reserves to prevent from external crises from the capital account due to foreign institutional investments (FIIs) and external commercial borrowings (ECBs) comes on the benefit side. Therefore, the costs of maintaining foreign exchange reserves and benefits of maintaining sufficient level of reserves assessment should be a continuous process.

## 2. REVIEW OF LITERATURE:

Mohanty and Turner (2006), emphasized on the process of sterilization, wherein it was argued that effective sterilization can bring fine results to a country. However, ineffective sterilization may obstruct the growth of the economy and may also bring macroeconomic instability. It was also noted that sterilized intervention is more effective in influencing the exchange rate in developing market economies. They have also discussed three possible and unwelcome implications of sterilization which are the fiscal costs of intervention, future monetary imbalances and financial sector imbalances. On the other hand Green and Torgerson (2007) found similar results, wherein the costs of excess reserves were considered. They have analysed the limit and gains from reserve accumulation. Evidence of sterilization costs, opportunity costs, central bank balance sheet risk and other costs were the focus of their study. Sen (2005) focused on RBI intervention to keep the real effective exchange rate constant, especially in the initial stages of the inflows when it was viewed as temporary. Green and Torgerson (2007) in their paper also examined the motivations of foreign exchange reserve accumulation among the world's largest emerging market holders of reserves. It has been noticed in their study that the top seven emerging market reserve holders

exceeded the standard reserve adequacy measures.

The study of Sahu (2015) focused on criterias for determining adequate level of reserves. The work of this paper basically focussed determining and maintaining the satisfactory level of reserve and measured the level of India's foreign exchange reserves. The study emphasized on the level of foreign exchange reserves that India maintained during the period of study and it was found that import coverage ratio far exceeded the global benchmark of 3 months. The commonly accepted ratio for covering short term external debt is 1, meaning thereby foreign exchange reserve should cover 100% of the country's short term debt and it should not fall below 100%. In India, it was found that this ratio has always been more than 1. Kapteyn (2001), in his study, suggested 5%-20% of reserves of M2, depending on the exchange rate system, as an appropriate buffer. India maintains market determined exchange rate system and it was found that ratio of foreign exchange reserves to broad money (M2) has always been more than 10%. However, Worrell's (1976), noted certain different criterias for determining adequate level of reserves by a developing country. His paper exhibit a framework to show a relationship between the stock of reserves and growth rate of the economy by taking the example of Jamaica, which is a small open economy heavily dependent on trade, specializing in a very few raw material exports and tourism, importing a large and diversified range of commodities and manufacturing a narrow range of final products. On one side, it was emphasized that the producing sector needs foreign inputs of raw materials and capital for the perfect operation and expansion of the business. On the other hand, countries like Jamaica hold substantial amounts of foreign financial assets, which he mainly referred to as foreign exchange reserves.

Polterovich and Popov (2003) reported for 1969-99 period and basically suggested that the accumulation of foreign exchange reserves (FER) contributes to the economic growth of a developing country by increasing both the Investment/GDP ratio and capital productivity. There has been a strong evidence that accumulation of foreign exchange reserves (FER) leads to depreciation of exchange rate, which in turn stimulates demand for exports and countries with rapidly growing FER/GDP ratios, other things being equal, exhibit higher investment/GDP ratios, higher trade/GDP ratios, higher capital productivity and higher rates of economic growth. Sen (2005) has also pointed out two types of inflows- Foreign Direct Investment (FDI) and Foreign Institutional Investment (FII) and volatility due to inflow of foreign capital. He has also pointed out that FDI add to the productive ability of a country and it also facilitates the transfer of technology and is not volatile as compared to FII. On the other hand, there are other inflows like FII and NRI deposits, which are considered highly volatile in his study. Dash and Narayanan (2011) attempt to identify the important determinants of foreign exchange reserves in India by using Johansen (1995) Maximum Likelihood Vector Error Correction Model (VECM) on monthly as well as annual data for reserves, nominal exchange rate and imports. The monthly data estimations showed that the exchange rate shock exert an everlasting effect on reserves, both on level and volatility. Hatase and Ohnuki (2009) invoke the competition among reserve currencies. Their paper basically explores the competition between the British pound sterling and the US dollar for the status of principal reserve currency in Japan during inter war period. Exchange rate appreciation was not significant, although the relative volatility of sterling compared to the dollar shows the expected negative sign. Singh (2005) basically focused on utilizing foreign exchange reserves for financing India's infrastructure. The amount of FER in India was quite modest when compared to some other countries in the region and he hardly found any evidence that any other country has used FER to finance infrastructure. It was found that at that time many of the companies pursuing infrastructure activities were yielding negative returns.

### 3. MATERIALS AND METHODS:

The paper has used annual time series data for the period of 1991-2017 for the ten variables, total exports, oil import, food import, other import, total imports, inflow of foreign direct investment, external commercial borrowings, total external debt, short term foreign external debt (as percent of total debt) and debt repayments. Data in this study has been extensively used from secondary sources. All the figures that are used in this study are collected from the national and international publications (Bhakri and Verma, 2020).

or analysing the impact of policy periods in terms of growth of the variables under consideration, dummy variables have been included in semi log growth regression equation from which it will become possible to find out different growth rates for different policy periods. Dummy variable takes the value of 0 and 1.

### 4. RESULTS AND DISCUSSIONS:

#### 4.1. Total Exports:

Table 4.1 presents regression statistics, for the growth of different policy periods, which tells us about the significance or insignificance level of different growth rates of total exports of India for respective policy periods.

**Table 4.1: Regression Statistics of Total exports of India**

	Coefficients	Standard Error	t Stat	P-value
Intercept	9.696686269	0.167516	57.88504	7.83E-23
Time	0.064714354	0.061168	1.057972	0.303334
D2	0.207273578	0.271099	0.764566	0.453922
D2T	0.001872054	0.066406	0.028191	0.977804
D3	-1.113936861	0.505906	-2.20187	0.040229
D3T	0.12053467	0.069358	1.737854	0.098418
D4	1.277866182	0.380434	3.358966	0.003296
D4T	-0.000412263	0.062995	-0.00654	0.994847

**Table 4.2: Growth Rates of Total Exports of India**

Policy Period	Intercept	ACGR (%)	About Growth Rate
Liberalization	9.696686269	6.685424	Insignificant
Globalization	9.696686269	0.187381	Insignificant
World recovery	8.582749408	12.80999	Insignificant
Global Financial Crises	10.97455245	-0.04122	Insignificant

Table 4.1 represents that during the period of liberalization, the initial level of total exports of India was positive and it is statistically significant also, as P-value is less than 0.05 (5%). The annual compound growth rate is found to be around 6.68%, but as its P-value is more than 5%, it is not statistically significant, so we do not reject the null hypotheses, and it can be concluded that, there was no growth in total exports of India during the period of liberalization. During the period of globalization, it can be seen that both the level of total exports as well as the growth rate, are insignificant as their respective P-values is less than 0.05, which concludes that there was no change in the level of total exports during the period of globalization as compared to liberalization. So the level of exports in the period of globalization is same as that of liberalization. Also, the growth rate in period of globalization is not statistically significant, so we do not reject the null hypotheses and can conclude that there was no growth in the value of total exports between the period of liberalization and globalization.

In the period of world recovery, it can be seen that the value of D3 is coming out to be statistically significant, and its intercept value is negative, which means decline in the value of total exports between the period of liberalization and world recovery. However, the growth rate in the period of world recovery is insignificant, so we do not reject the null hypotheses and concludes that there was no growth in the value of total exports during the period of liberalization and world recovery. This means that world recovery has a significant impact on the level of total exports, but no impact on its growth rate.

Similar results are found for the period of global financial crises, but in this period instead of falling, the total exports increased as compared to liberalization and it is statistically significant also, this means that we reject the null hypotheses and concludes that there was change in the level of total exports between the periods of liberalization and crises. The growth rate remains unaffected, as it is insignificant, and hence we do not reject the null hypotheses, meaning there was no growth in the value of total exports between the periods of liberalization and global financial crises.

Further this can be seen in the following Figure 4.1, which tells us about the growth curve of total exports of India during four major policy periods.



#### 4.2 Oil Import:

Table 4.3 presents regression statistics, for the growth of different policy periods, which tells us about the significance or insignificance level of different growth

rates of oil imports of India for respective policy periods.

**Table 4.3: Regression Statistics for Oil Imports of India**

	Coefficients	Standard Error	t Stat	P-value
Intercept	8.665470542	0.299792491	28.9049	3.62E-17
Time	-0.000395689	0.10946874	-0.00361	0.997154
D2	-0.564098364	0.485168335	-1.16269	0.259353
D2T	0.125212876	0.118841486	1.053613	0.305276
D3	-2.660723027	0.905384983	-2.93878	0.008428
D3T	0.289734821	0.124125884	2.334201	0.030716
D4	2.459214713	0.680837642	3.612043	0.001857
D4T	0.022345327	0.112737181	0.198207	0.844988

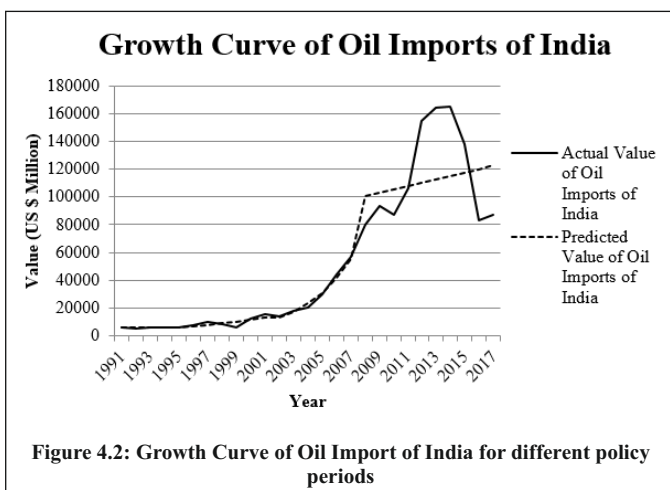
**Table 4.4: Growth of Oil Imports of India for different policy periods**

Policy Period	Intercept	ACGR (%)	About Growth Rate
Liberalization	8.665470542	-0.03956	Insignificant
Globalization	8.665470542	13.33897	Insignificant
World recovery	6.004747516	33.60731	Significant
Global Financial Crises	11.12468526	2.259685	Insignificant

Table 4.3 represents the initial level of oil imports by India during the period of liberalization, which is around US \$8.66 million, and it is statistically significant also, as P-value is less than 0.05 (5%). However, looking at the annual compound growth rate, we found that it is not coming out to be statistically significant, so we do not reject the null hypotheses, that there was no growth in oil imports of India during the period of liberalization.

The level of oil imports stays unaffected during the period of globalization as D2 is coming out to be insignificant, so it can be said that there was no change in the value of oil imports of India between the period of liberalization and globalization. Also, the annual compound growth rate is also insignificant, so it can be said that there was no growth in oil imports between the period of liberalization and globalization. During the period of world recovery, the level of oil imports came down and it is statistically significant, meaning that world recovery has a significant impact on the level of oil import between the period of liberalization and world recovery. The annual compound growth rate is also coming out to be significant, as its P-value is less than 0.05 (5%), so it is being concluded that there was growth in the period of world recovery as compared to liberalization. The impact of crises can be seen in large amount of increase in the level of oil imports as compared to liberalization and it is statistically significant also. The growth rate is not statistically significant, so we do not reject the null hypotheses, that there was no growth in the value of oil imports between the periods of liberalization and world recovery.

Further this can also be seen with the help of the following Figure 4.2, which tells us about the growth rate of oil imports of India during four major policy periods.



#### 4.3. Food Import:

Table 4.5 presents regression statistics, for the growth of different policy periods, which tells us about the significance or insignificance level of different growth rates of food imports of India for respective policy periods.

**Table 4.5: Regression Statistics for Food Import of India**

	Coefficients	Standard Error	t Stat	P-value
Intercept	6.234985808	0.284451	21.91937	1.97E-14
Time	-0.098563504	0.103867	-0.94894	0.355218
D2	0.152324979	0.46034	0.330896	0.744544
D2T	0.214822279	0.11276	1.90513	0.072866
D3	0.013162568	0.859053	0.015322	0.987944
D3T	0.216753566	0.117774	1.840421	0.082254
D4	-0.575418526	0.72252	-0.79641	0.436175
D4T	0.256963147	0.108108	2.376911	0.028756

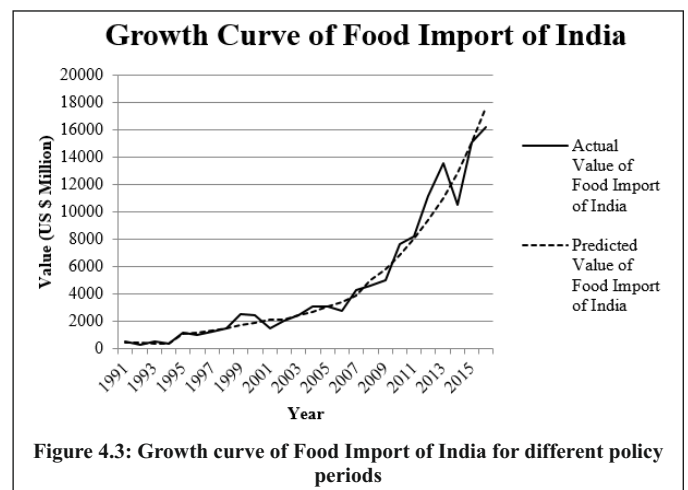
**Table 4.6: Growth Rates of Food Import of India for different policy periods**

Policy Period	Intercept	ACGR (%)	About Growth Rate
Liberalization	6.234986	-9.38619	Insignificant
Globalization	6.234986	23.96416	Insignificant
World recovery	6.234986	24.2038	Insignificant
Global Financial Crises	6.234986	29.29975	Significant

From Table 4.5, it can be seen that there are only two variables which are coming out to be statistically significant, these are Intercept during the period of liberalization and D4T, which is the growth rate between the period of liberalization and crises. Table 4.6 shows significance or insignificance of annual compound growth rates, and it seems that only one growth rate, which is of global financial crises is coming out to be significant. Rest all other growth rates are insignificant, meaning there was no growth during in food imports of India during the period of liberalization, between the period of liberalization and globalization, and between the period of liberalization and world recovery. So, it can be concluded that only the period of global financial crises has significant impact on the growth of food imports.

The intercept during the period of liberalization is positive and it is statistically significant also, as its P-value is less than 0.05 (5%). The level of food import during the period of liberalization and globalization has not changed, because its intercept is coming out to be insignificant. Same is the case with world recovery period and crises period. This means that, the level of food import has not change in any of the period and it is same as it is in the period of liberalization.

Further, this can be seen with the help of following Figure 4.3, which tells us about the growth rates of food imports of India during the four major policy periods.



#### 4.4. Other Import:

Table 4.7 presents regression statistics, for the growth of different policy periods, which tells us about the significance or insignificance level of different growth rates of other imports of India (imports other than oil and food) for respective policy periods.

**Table 4.7: Regression Statistics of Other Imports of India**

	Coefficients	Standard Error	t Stat	P-value
Intercept	9.69055436	0.146376	66.20295	6.18506E-24
TIME	0.003023621	0.053449	0.05657	0.955478353
D2	0.097590019	0.236888	0.411967	0.684974203
D2T	0.067621816	0.058025	1.165382	0.258287014



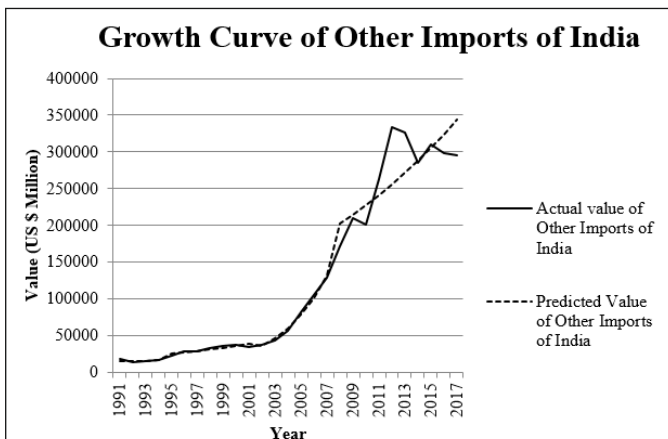
D3	-2.35039867	0.442063	-5.31689	3.93663E-05
D3T	0.258760996	0.060606	4.269588	0.000414104
D4	1.467810281	0.332425	4.415459	0.000297091
D4T	0.055840409	0.055045	1.014451	0.323112838

**Table 4.8: Growth Rates of Other Imports of India during different policy periods**

Policy Period	Intercept	ACGR (%)	About Growth Rate
Liberalization	9.690554	0.30282	Insignificant
Globalization	9.690554	6.996059	Insignificant
World recovery	7.340156	29.53242	Significant
Global Financial Crises	11.15836	5.742891	Insignificant

Table 4.7 represents the regression statistics of other imports of India during the four major policy periods, only the intercept during the period of liberalization, D3T (growth rate between liberalization and world recovery) and D4 i.e., the level of other imports between the periods of liberalization and crises, are coming out to be statistically significant.

The initial level of other imports during the period of liberalization is positive and it is statistically significant also, however the growth rate is insignificant, meaning that there was no growth in the value of other imports during the period of liberalization. During the period of globalization, the level of other imports will remain unchanged as the value of D2 is coming out to be insignificant. Also there will be no growth between the period of liberalization and globalization as the value of D2T (growth rate or slope) is not significant. During the period of world recovery, the level of other imports have got reduced as compared to liberalization, and it is statistically significant also. The growth rate is around 29.5% between the period of liberalization and world recovery and it is statistically significant also. This means that we reject the null hypotheses and concludes that there was growth in the value of other imports of India during the period of world recovery as compared to liberalization. Impact of crises can be seen in large amount of increase in the level of other imports and it is statistically significant also, meaning that the level of other imports have changed as compared to liberalization. However, there was no growth during the period of crises as compared to liberalization, but still we see an increase in the level of other imports. This situation can be termed as "euphoria". Further this can be seen with the help of following Figure 6.5, which tells us about the growth curve of other imports of India during the four major policy periods.



**Figure 4.4: Growth Curve of Other Imports during different policy periods**

#### 4.5. Total Import:

Table 4.9 presents regression statistics, for the growth of different policy periods, which tells us about the significance or insignificance level of different growth rates of total imports of India for respective policy periods.

**Table 4.9: Regression Statistics of Total Imports of India**

	Coefficients	Standard Error	t Stat	P-value
Intercept	9.997372758	0.163426	61.17354	2.75678E-23
TIME	0.002277987	0.059675	0.038173	0.969947757
D2	-0.068587821	0.264481	-0.25933	0.79816954
D2T	0.083033851	0.064784	1.281698	0.215369529
D3	-2.44054522	0.493554	-4.94484	8.99326E-05
D3T	0.267437527	0.067665	3.952378	0.000854244
D4	1.728321388	0.371146	4.656712	0.000171934
D4T	0.0472094	0.061457	0.768174	0.451826222

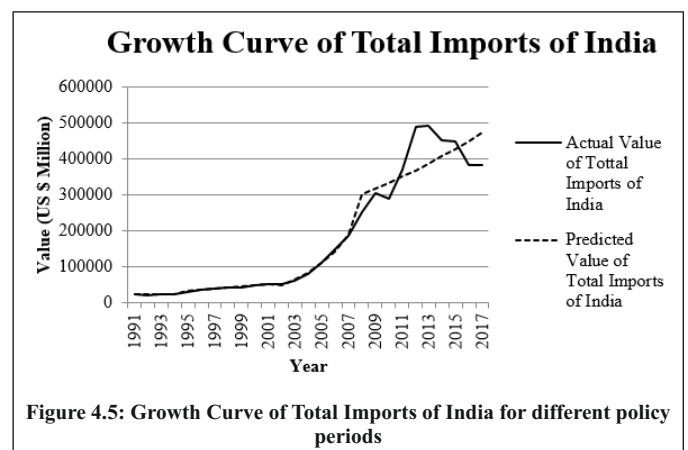
**Table 4.10: Growth rates of Total Imports of India for different policy periods**

Policy Period	Intercept	ACGR (%)	About Growth Rate
Liberalization	9.997373	0.228058	Insignificant
Globalization	9.997373	8.657859	Insignificant
World recovery	7.556828	30.6612	Significant
Global Financial Crises	11.72569	4.834151	Insignificant

Table 4.9 represents that during liberalization, the level of total imports of India is positive and it is statistically significant also, as its P-value is less than 0.05 (5%). The growth rate during the period of liberalization is coming out to be around 22%, but as it is not statistically significant, meaning, that there was no growth in total imports of India during the period of liberalization. During the period of globalization, it can be seen that both the differential intercept as well as the differential growth rate are coming out to be insignificant, meaning that the level of total imports remain unchanged during the period of liberalization as compared to globalization and there is no growth between the period of liberalization and globalization.

In world recovery, the level of total imports got decreased, and it is statistically significant also. But as it can be seen that the growth during the period of world recovery is very high, and it is statistically significant also. So we reject the null hypotheses that there was no growth in the value of total imports between the periods of liberalization and world recovery. Impact of crises can be seen by an increase in the value of total imports and it is statistically significant also, so we reject the null hypotheses that there was no change in the value of total imports between the period of liberalization and global financial crises. However, looking at its growth rate, there is a very large decline, but as it is not statistically significant, it can be concluded that there was no growth in total imports between the period of liberalization and global financial crises.

Further, this can be seen with the help of the following Figure 4.5, which tells us about the growth curve of total imports of India during the four major policy periods.



**Figure 4.5: Growth Curve of Total Imports of India for different policy periods**

#### 4.6. Inflow of FDI:

Table 4.11 presents regression statistics, for the growth of different policy periods, which tells us about the significance or insignificance level of different growth rates of inflows of FDI in India for respective policy periods.

**Table 4.11: Regression Statistics of Inflow of FDI into India**

	Coefficients	Standard Error	t Stat	P-value
Intercept	3.668622201	0.361479205	10.14891631	4.14566E-09
TIME	0.843683997	0.131993543	6.391858092	3.9468E-06
D2	3.494001878	0.584998855	5.972664471	9.51613E-06
D2T	-0.740230319	0.14329487	-5.165783823	5.49727E-05
D3	-0.11225916	1.091681259	-0.102831444	0.919174337
D3T	-0.464801311	0.14966661	-3.105577861	0.005822271
D4	5.711995517	0.82093	6.95795685	1.24746E-06
D4T	-0.792668532	0.135934514	-5.831252914	1.28699E-05

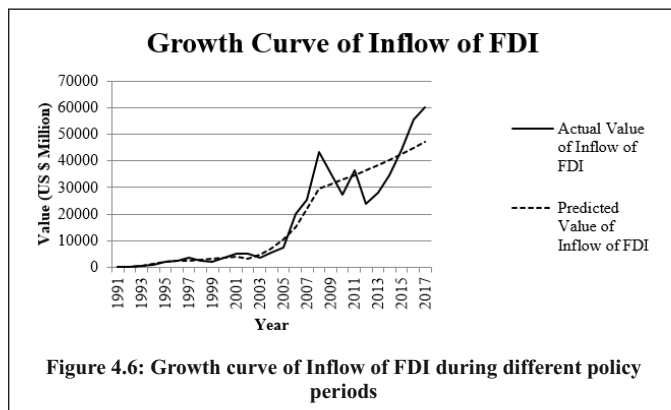
**Table 4.12: Growth Rates of Inflow of FDI during different policy periods**

Policy Period	Intercept	ACGR (%)	About Growth Rate
Liberalization	3.668622	132.4916	Significant
Globalization	7.162624	10.89944	Significant
World recovery	3.668622	46.06517	Significant
Global Financial Crises	9.380618	5.233917	Significant

Table 4.11 represents that during liberalization, the level of inflows of FDI into India is positive and it is statistically significant also. Impact of liberalization on the growth rate of FDI inflow can be seen in large percentage, as there is more than 100% growth in FDI inflows, and it is statistically significant also. This means that inflows of FDI grows at around 132% during the period of liberalization. In the period of globalization, there is "euphoria". The level of inflows of FDI increased sharply from 3.66 to 7.16, which is statistically significant also. This means that we reject the null hypotheses that there was no change in inflows of FDI during the period of globalization, as compared to liberalization. However, while looking at the growth rate, it is noted that growth fall drastically between the period of liberalization and globalization, and it is statistically significant also.

During the period of world recovery, there is no change in the level of FDI inflows, because the value of D3 is coming out to be significant. This concludes that there was no change in the level of inflows of FDI during the period of world recovery as compared to liberalization. The annual compound growth rate is coming out to be around 46%, and it is statistically significant also. So, here we reject the null hypotheses that there is no growth in inflows of FDI between the periods of liberalization and world recovery. Again, in times of crises, we witnessed a situation of "euphoria", as the level of FDI inflows increased sharply, while its growth rate decreased and both of them are statistically significant. This means that the level of FDI inflows changed during the period of crises as compared to liberalization and there was growth in inflows of FDI between the period of liberalization and global financial crises.

Further, this can be seen with the help of the following Figure 4.6, which tells us about the growth curve of inflows of FDI in India during the four major policy periods.



#### 4.7. External Commercial Borrowings:

Table 4.13 presents regression statistics, for the growth of different policy periods, which tells us about the significance or insignificance level of different growth rates of External Commercial Borrowings of India for respective policy periods.

**Table 4.13: Regression Statistics of External Commercial Borrowings of India**

	Coefficients	Standard Error	t Stat	P-value
Intercept	9.204105929	0.14191	64.85869	9.11817E-24
TIME	0.056815044	0.051818	1.096429	0.286594035
D2	-0.307299457	0.22966	-1.33806	0.19667084
D2T	0.050277813	0.056255	0.893749	0.382637742
D3	-0.494555764	0.428574	-1.15396	0.262827514
D3T	0.044511127	0.058756	0.757554	0.458011221
D4	-0.648255735	0.322282	-2.01145	0.058680362
D4T	0.080658154	0.053365	1.511431	0.14713267

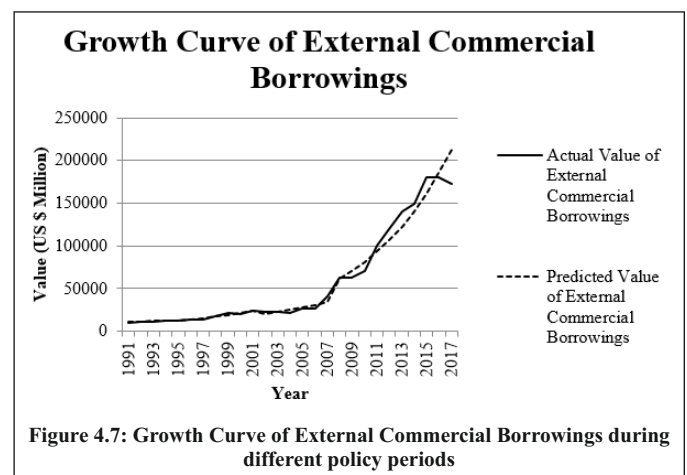
**Table 4.14: Growth Rates of External Commercial Borrowings during different policy periods**

Policy Period	Intercept	ACGR (%)	About Growth Rate
Liberalization	9.204106	5.846002	Insignificant
Globalization	9.204106	5.156319	Insignificant
World recovery	9.204106	4.551661	Insignificant
Global Financial Crises	8.55585	8.400027	Insignificant

Table 4.13 represents that during liberalization, the level of external commercial borrowings is positive and it is statistically significant also. The growth rate during the period of liberalization is around 5%, but as it is not coming out to be significant, therefore we do not reject the null hypotheses and concludes that there

was no growth in the value of external commercial borrowings during the period of liberalization. During globalization, the level of external commercial borrowings remains unchanged as the value of D2 is insignificant. The growth rate between the period of liberalization and globalization is also coming out to be insignificant, therefore, it can be concluded that there was no growth in the value of external commercial borrowings between the periods of liberalization and globalization. Same results are found during the period of world recovery. The level of external commercial borrowings remains same and there is no growth in the value of external commercial borrowings between the periods of liberalization and world recovery.

The impact of global financial crises can be seen by a decrease in the value of external commercial borrowings as compared to liberalization and it is statistically significant at 10% level of significance. The growth rate is coming out to be insignificant, meaning there was no growth in the value of external commercial borrowings during the period of global financial crises as compared to liberalization. Further this can be seen with the help of the following Figure 4.7, which tells us about the growth curve of external commercial borrowings during the four major policy periods.



#### 4.8. Total Debt:

Table 4.15 presents regression statistics, for the growth of different policy periods, which tells us about the significance or insignificance level of different growth rates Total Debt of India for respective policy periods.

**Table 4.15: Regression Statistics of Total Debt of India**

	Coefficients	Standard Error	t Stat	P-value
Intercept	11.29454459	0.088204	128.0501	2.29214E-29
TIME	0.035652305	0.032208	1.106954	0.282132248
D2	0.126100065	0.142745	0.883395	0.388064298
D2T	-0.028350125	0.034965	-0.81081	0.427515158
D3	-1.004491695	0.26638	-3.7709	0.001292839
D3T	0.061690082	0.03652	1.689215	0.107521803
D4	-0.733615066	0.200314	-3.66232	0.001655992
D4T	0.062706943	0.033169	1.890516	0.074040293

**Table 4.16: Growth rate of Total Debt of India during various policy periods**

Policy Period	Intercept	ACGR (%)	About Growth Rate
Liberalization	11.29454	3.629547	Insignificant
Globalization	11.29454	-2.7952	Insignificant
World recovery	10.29005	6.363265	Insignificant
Global Financial Crises	10.56093	6.471477	Significant

Table 4.15 represents that during liberalization the level of total debt of India is positive and it is statistically significant also. The growth rate is insignificant, which means there is no growth in the value of total debt during the period of liberalization. In the period of globalization, the level of total debt does not change as the value of D2 is coming out to be insignificant. There is no growth in the value of total debt between the period of liberalization and globalization, as the value of D2T is coming out to be insignificant.

During the period of world recovery, the level of total debt got decreased as compared to liberalization, and it is statistically significant at 5% level of significance. The growth rate during the period of world recovery is also coming out to be insignificant, which means we do not reject the null hypotheses that there is no growth in the value of total debt of India during the period of world recovery as

compared to liberalization. In times of crises, the level of total debt has reduced as compared to liberalization, and it is statistically significant at 5% level of significance. The growth rate during the period of global financial crises is around 6.47%, which is statistically significant at 10% level of significance. This means that we reject the null hypotheses that there is no growth in the value of total debt between the period of liberalization and global financial crises. However, this value is not significant at 5% level of significance.

Further, this can be seen with the help of the following Figure 4.8, which tells us about the growth curve of total debts of India during four major policy periods.

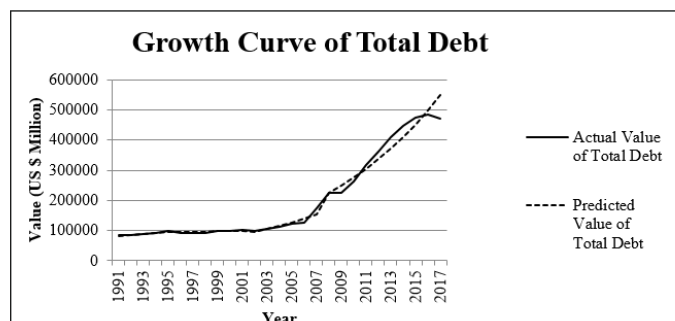


Figure 4.8: Growth Curve of Total Debt during different policy periods

#### 4.9. Short term Foreign Debt (STD):

Table 4.17 presents regression statistics, for the growth of different policy periods, which tells us about the significance or insignificance level of different growth rates Short term Foreign Debt of India for respective policy periods.

Table 4.17: Regression Statistics of Short Term Foreign Debt of India

	Coefficients	Standard Error	t Stat	P-value
Intercept	9.389401606	0.253289	37.06987	3.4646E-19
TIME	-0.269805582	0.092488	-2.91719	0.008838231
D2	-0.55832222	0.40991	-1.36206	0.189110069
D2T	0.221612364	0.100407	2.207139	0.039803659
D3	-6.336501614	0.764944	-8.28362	9.95106E-08
D3T	0.669257955	0.104872	6.38168	4.03095E-06
D4	-0.157592081	0.575228	-0.27396	0.787067979
D4T	0.355492916	0.09525	3.732224	0.001412088

Table 4.18: Growth Rates of Short term Foreign Debt during different policy periods

Policy Period	Intercept	ACGR (%)	About Growth Rate
Liberalization	9.389402	-23.6472	Significant
Globalization	9.389402	-4.70504	Significant
World recovery	3.0529	49.1008	Significant
Global Financial Crises	9.389402	8.946564	Significant

Table 4.17 represents that during the period of liberalization, the level of short term foreign external debt is positive, and it is significant also, as its P-value is less than 0.05 (5%). The growth rate during liberalization is negative, meaning there was decline in the growth over the period of liberalization. There was negative growth rate of around 23.6% and it is statistically significant also. This means that, during liberalization, India's short term foreign debt got reduced. Coming to the period of globalization, there is no change in the level of short term foreign debt and it is same as that in the period of liberalization. This is so because the value of D2 is coming out to be insignificant, which means that there was no change in the value of short term foreign debt during the period of globalization as compared to liberalization. During globalization, the growth rate showed some positive response and it is statistically significant also. However, it is still negative at around 4%. This means that there was growth in the value of short term foreign debt between the periods of liberalization and globalization.

During world recovery, the initial level of short term foreign debt got reduced very drastically, and it is statistically significant also, meaning that there was change in the value of short term foreign debt during the period of world recovery as compared to liberalization. While looking at the growth rate, there is a very high rise in the rate of growth of short term foreign debt at around 49% as compared to negative growth during the period of liberalization. This is statistically significant at 5% level of significance, which means we reject the null hypotheses that there was no growth in the value of short term foreign debt between the period of liberalization and world recovery.

In times of global financial crises, the level of short term foreign debt does not

change and it is same as that in liberalization. This is because the value of D4 is insignificant. The growth rate during the period of crises as compared to liberalization is around 8.9%, and it is significant also, which means that there is growth in short term foreign debt of India.

Further, this can be seen with the help of the following Figure 4.9, which tells us about the growth curve of short term foreign debt of India.



Figure 4.9: Growth Curve of Short Term Foreign Debt of India during different policy periods

#### 4.10. Debt Repayment:

Table 4.19 presents regression statistics, for the growth of different policy periods, which tells us about the significance or insignificance level of different growth rates Debt Repayments of India for respective policy periods.

Table 4.19: Regression Statistics of Debt Repayments of India

	Coefficients	Standard Error	t Stat	P-value
Intercept	7.718399251	0.263694	29.27025	1.23835E-16
TIME	0.077224314	0.096288	0.802018	0.433004204
D2	0.366184681	0.426749	0.85808	0.402130139
D2T	-0.070985054	0.104532	-0.67908	0.505728053
D3	2.376353483	0.796367	2.983993	0.007957504
D3T	-0.202183097	0.10918	-1.85184	0.08052449
D4	-0.651043572	0.669797	-0.972	0.343931253
D4T	-0.022234138	0.100219	-0.22185	0.826924374

Table 4.20: Growth Rates of Debt Repayments for different policy periods

Policy Period	Intercept	ACGR (%)	About Growth Rate
Liberalization	7.718399	8.028437	Insignificant
Globalization	7.718399	-6.85242	Insignificant
World Recovery	10.09475	-18.3055	Significant
Global Financial Crises	7.718399	-2.19888	Insignificant

Table 4.19 represents that during liberalization, the debt repayments of India are positive and it is statistically significant at 5% level of significance. This means that India was paying its debt during the period of liberalization, which leads to outflow of foreign exchange reserves. However, looking at the growth rate, there is no growth in debt repayment during liberalization, because the growth rate is coming out to be insignificant. During globalization, there is no change in the level of debt repayments of India, and it is same as that in liberalization. This is so, because the value of D2 is insignificant. The growth rate is also insignificant, meaning that there is no growth in debt repayments between the periods of liberalization and globalization. The period of world recovery witnessed "euphoria" in debt repayments, the value of debt repayment during the period of world recovery as compared to liberalization increased and it is statistically significant also, but on the other hand we see that the growth rate is coming out to be negative, meaning there was a decline in debt repayments between the periods of liberalization and world recovery. The growth rate is significant at 10% level of significance, whereas the intercept value i.e., D3 is significant at 5% level of significance.

Further, there is no impact of global financial crises on the level of debt repayments, and the growth rate is also insignificant, meaning there is no growth in the value of debt repayments during the period of global financial crises as compared to liberalization.

This can also be seen with the help of the following Figure 4.10, which tells about the growth curve of debt repayments of India during the four major policy periods.



## 4.11. Overall Analysis:

Table 4.21: Consolidated Table

Variables	LEXP		LOIM		LFIM		LOTIM		LTIM		LFDI		LECB		LTDBT		LSTD		LDR	
Policy Period	Intercept	Slope	Intercept	Slope	Intercept	Slope	Intercept	Slope	Intercept	Slope	Intercept	Slope	Intercept	Slope	Intercept	Slope	Intercept	Slope	Intercept	Slope
Liberalization	9.69	6.68	8.66	-0.04	6.23	-9.38	9.69	0.302	9.99	0.228	3.66	132.49	9.20	5.84	11.29	3.63	9.39	-23.6	7.71	8.03
Globalization	9.69	0.18	8.66+(-0.56)	13.33	6.23+0.152	23.96	9.69+0.097	6.99	9.99+(-0.07)	8.65	3.66+3.49	10.89	9.20+(-0.31)	5.15	11.29+0.126	-2.79	9.39+(-0.55)	-4.705	7.71+(0.36)	-6.85
World-Recovery	9.69+(-1.11)	12.809	8.66+(-2.66)	33.6	6.23+0.013	24.2	9.69+(-2.35)	29.53	9.99+(-2.44)	30.66	3.66+(-0.11)	46.06	9.20+(-0.49)	4.55	11.29+(-1.)	6.36	9.39+(-6.33)	49.1	7.71+(2.37)	-18.3
Crises	9.69+(1.27)	-0.04	8.66+(2.45)	2.26	6.23+(-0.57)	29.299	9.69+1.46	5.74	9.99+1.728	4.834	3.66+5.711	5.233	9.20+(-0.65)	8.4	11.29+(-0.73)	6.47	9.39+(-0.15)	8.94	7.71+(-0.65)	-2.19

\*Values in bold are significant

Table 4.21 represents the intercept and slope of each variable that we have discussed so far. In this consolidated table, an overall analysis of the variables is presented, during the different policy periods. This helps in understanding the impact of policy periods in a more precise manner.

By looking at the table, during liberalization, the level of total debt is much higher than other variables. This is followed by total imports of India. During liberalization, the initial level of all the variables is significant at 5% level of significance and FDI showed the highest growth rate among all the variables with more than 100% and it is significant also. This may be because of the implementation of the new economic policy by the Indian government, which adopted the policy of liberalization during 1991. This paves the way towards positive and significant growth in the value of FDI. The second highest growth rate is of foreign exchange reserves at around 44% and it is significant also. However, looking at the variables like total exports, oil import, food import, other import, total import, external commercial borrowings, total debt and debt repayment, it can be seen that their growth rate is positive but it is not statistically significant, meaning we do not reject the null hypotheses and concludes that there was no growth in the value of these variables during the period of liberalization. One very important variable is short term foreign debt (STD), whose growth rate is negative, meaning there was a fall in the value of short term foreign debt during the period of liberalization and it is statistically significant also.

The variable which is coming out to be significant in terms of level and growth is Foreign Direct Investment (FDI), whose level got increased. However, looking at its growth rate during globalization as compared to liberalization, it is being noted that growth rate of FDI decreased very sharply from around 132% to 10.89%. So, it can be said that the growth of FDI was positive but at a decreasing rate. The level of short term debt falls as compared to liberalization, but as it is not statistically significant, meaning that there was no change in the value of short term foreign debt during the period of globalization as compared to liberalization. While looking at the growth rate of SFD, the growth rate increased from negative 23.6% to negative 4.705%, which means the rate of growth is still negative but it has increased as compared to that in the period of liberalization. This is statistically significant also. Rest all variables are coming out to be statistically insignificant, meaning that the level of these variables did not change between the period of liberalization and globalization and also their growth rate remained same as that in the period of liberalization.

During the inception of World Recovery period, the level of total debt of India decreased as compared to liberalization, and it is statistically significant also. While looking at its growth rate, there is a positive increase in the growth rate of total debt as compared to liberalization, but it is not statistically significant, which means that the growth rate remains same as that of liberalization. While looking at the other debt variable, i.e., short term foreign debt (STD), the level of STD decreased as compared to liberalization and it is statistically significant also. The growth rate is also positive and it is statistically significant. The figure shows that STD increased at 49.1% between the period of world recovery and liberalization. The other significant variable is Oil Import (LOIM), which decreased during the period of world recovery as compared to liberalization and it is statistically significant also. The growth rate of oil import showed a positive response and there is growth of around 33% during the period of world recovery as compared to liberalization. Similarly the value and growth rate of other import (LOTIM) and debt repayment (LDR) are statistically significant, and both shows a fall in their respective levels and an increase in the growth rate between the period of world recovery and liberalization.

Impact of global financial crises can be majorly seen on foreign direct investment (LFDI) and total debt of India (LTDBT). In case of FDI, there was a sharp increase in the value of FDI and it is statistically significant also. This means that as India was less affected in times of crises, it did attract FDI and therefore it is coming out to be positive. The growth rate has drastically fall from 132% in liberalization to around 5% in period of crises and it is statistically significant also.

This means that, because of the prevailing crises situation in the world, the rate of growth of FDI decreased as compared to that in liberalization.

The level of total debt of India decreased during the period of crises as compared to liberalization and it is statistically significant also. However its growth rate have increased as compared to that in liberalization and it is statistically significant also. The growth rate of food import (LFIM) has significantly increased to 29.99% and it is statistically significant also, meaning the growth rate of food imports has increased as compared to liberalization. The growing demand of food import by India may be because of the prevailing crises in the world, and as food is a necessity, so we cannot compromise on its consumption. The growth rate of STD has also increased as compared to liberalization and it is statistically significant also. The level of total exports (LEXP), oil import (LOIM), total import (LTIM) and external commercial borrowings (LECB) have increased as compared to liberalization and it is statistically significant, meaning we reject the null hypotheses that there was no change in the value of total exports, oil import, total import and external commercial borrowings between the period of liberalization and global financial crises. This means that all these variables grew significantly during crises period as compared to liberalization.

## 5. CONCLUSION:

The paper has analysed the impact of different policy periods on the various macroeconomic indicators of foreign exchange reserves in India, namely exports, imports, FDI etc. The study has rejected twenty eight hypotheses out of total seventy hypotheses as they are coming out to be significant at 5% level of significance.

There are four policy periods, i.e., Liberalization, Globalization, World Recovery and Global Financial Crises are being considered for the analysis (Bhakri and Verma, 2020). It has been noted, out of ten variables, foreign direct investment (FDI) and short term foreign debt (STD) are coming out to be most significant in all the periods. The other variables are either less significant or not significant at all.

The above analysis conclude that the level of foreign direct investments has significantly grown in all the policy periods except world recovery, and its growth rate is significant in all the policy periods (Bhakri and Verma, 2020). As far as the short term debt is concerned, the growth rates of all the periods are significant at 5% level of significance, but as far as its intercept is concerned, during the periods of globalization and crises, it is coming out to be insignificant.

The consolidated table for comparing all the variables at the same place has provided the insight into the various impacts of different policy periods on each variable. It should also be noted that there are several implications for the policy makers of India, as all the variables under consideration, are macroeconomic indicators of foreign exchange reserves. The variables under consideration and their significant impact on foreign exchange reserves have been reviewed by various researchers. The current paper can be of great use for the policy makers as it will help them to analyse the trends in the various macroeconomic indicators of foreign exchange reserves in India not only during various policy periods but also in predicting the future trends of these variables.

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